

# Operating instructions telos-Stress-Device GA-III/E

acc. to Prof. Dr. G. Scheuba



telos

## Designation of symbols

In this manual and/or on the device the following symbols are used:



### **Attention – refer to the accompanying documents**

Hints for the setup, maintenance and intended operation of the telos Stress Device, type GA-III/E.

Must be observed to avoid bodily injuries, malfunctions or damages to your equipment.



### **Application part of type B**

The device complies with the requirements of type B for protection against electrical shock.



### **Serial number of the device**

The serial number is placed right-hand next to the symbol.

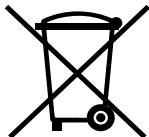


### **Order number of the device**

The order number is placed right-hand next to the symbol.



Device complies with EC-Directive 93/42/EC (MDD)



Disposal (Recycling)



### **Manufacturer of the device**

The name of the manufacturer is placed right-hand next to the symbol.



### **Date of manufacture**

The date of manufacture is placed under the symbol.

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## Safety Instructions

Please read the operating instructions carefully before operating the telos-Stress-Device.

This device is manufactured and tested according to the actual rules of electrical and electromagnetic safety. In case you experience failures (e.g.: false reading or no display) caused by interferences of other appliances, operate the Stress Device in a greater distance to the interfering appliance.

To clean and disinfect any tested, approved wipe disinfectant commercially available can be used.

Repair procedures are only allowed for authorized personnel who are thoroughly familiar with applicable safety regulations.

If necessary, it is recommended to have the device repaired by the manufacturer in order to maintain the warranty.

For this device it is mandatory to perform frequent safety inspections (different regulations in other countries may apply).

It is recommended to check the device once a year by the manufacturer and if necessary to calibrate it in order to maintain the accuracy of the force measuring unit.

The minimum lifetime of the device is 5 years. After that period the device can be returned to the manufacturer for recycling purposes free of charge.

Please note that especially the batteries and electronic parts do not belong to regular waste, but have to be disposed of according to local legal regulations.



Devices that are marked with the symbol on the left may not be disposed of with the regular household trash, but must be surrendered to a recycling center for electric and electronic devices.



**Please do not place the telos-Stress-Device under water!**

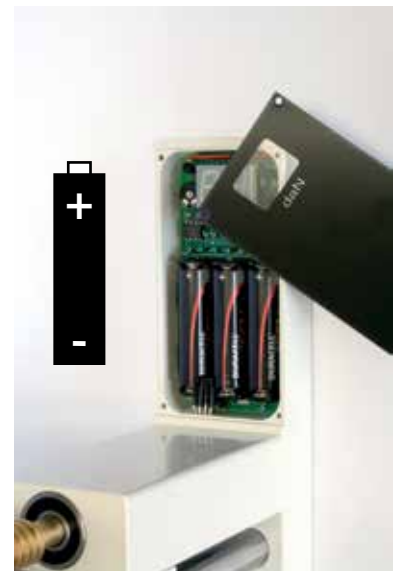
## Changing the batteries



Remove the 4 screws of the front cover.



Remove the 3 batteries (type AA).



Insert the new batteries  
(Please note the correct polarity).  
Replace the front cover and fasten the screws (tighten carefully).



**Do not use rechargeable batteries (accumulators).**

## Technical Data GA-III/E

**Manufacturer:** METAX Kupplungs- und Dichtungstechnik GmbH  
Unter den Linden 34  
D-35410 Hungen  
Phone: +49-6036-9733-0  
Fax: +49-6036-9733-18  
Internet:  
www.telos-stress-device.com

**Model:**  
telos-Stress-Device

**Type:**  
GA-III/E

**Protection type:**  
B (= live wires are single insulated against contact)



The device complies with the requirements of type B for protection against electrical shock and is marked with the adjacent symbol.

**Environmental condition for transport, storage and use:**  
10 - 40 °C, 85 % humidity

**Classification:**  
acc. Annex IX MDD 93/42/EC: Im

**Power Supply:**  
4,5 V DC through 3 Mignon batteries à 1.5 V (type AA)

**Maximum force to be applied:**  
25 daN (Standard value is 15 daN)  
Accuracy at standard value  $\pm 1$  daN

**Maintenance:**  
It is recommended to check the telos-Stress-Device by the manufacturer and if necessary to calibrate it once a year in order to maintain the accuracy of the force measuring unit.

**Dimensions (Width x Depth x Height):**  
Min. space requirement for device:  
500 x 650 x 220 mm  
Dimensions of Transport and storage case:  
510 x 410 x 170 mm

**Weight:**  
Device w/o accessory in case: 10,1 kg  
Accessories: 3,8 kg  
Device complete in case: 13,9 kg

## Electromagnetical Compatibility (EMC)

Recommended separation distances between portable and mobile RF communications equipment and the telos-Stress-Device type GA-III/E.

The telos-Stress-Device type GA-III/E is intended for use in the electromagnetic environment mentioned below. The customer or the user of the telos-Stress-Device type GA-III/E can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the telos-Stress-Device type GA-III/E as recommended below, according to the rated output power of the communications equipment.

	Separation distance according to frequency of transmitter m		
Rated output of transmitter W	150 kHz to 80 MHz $d = 1,2\sqrt{P}$	80 MHz to 800 MHz $d = 1,2\sqrt{P}$	800 MHz to 2,5 GHz $d = 2,3\sqrt{P}$
0,01	0,12	0,12	0,23
0,1	0,38	0,38	0,73
1	1,2	1,2	2,33
10	3,8	3,8	7,3
	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance  $d$  in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where  $P$  is the maximum output power rating of the transmitter on watts (W) according to the transmitter manufacturer.

**Note 1:** An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 80 MHz and 2,5 GHz in the frequency range to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient area.

**Note 2:** These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from buildings, objects and people.

## telos-Stress-Device

The type of ligamental rupture depends on the direction, speed and force which occur on the ligament or its attachments to the cartilage or bone.

The X-ray can only show the injury when the ligament rupture is located at the bone and contains an avulsion. Normally, ligamental rupture can be demonstrated by a stress X-ray. In this case, imaging shows an extreme position of the joint, which diagnoses an opening or subluxation. For each joint there are routine methods, which allow for an examination standardization for diagnosis.

A proper functional diagnostic examination is subject to consideration of all biomechanically relevant joint stabilizing factors, which are:

1. the specific anatomy of the joint
2. the muscles
3. the capsular ligamental structures

For proper assessment of the ligament, point 1 and 2 are taken into account by positioning the patient such that his muscles are relaxed and the stress on the ligament cannot be reduced by the nature of the joint anatomy.

The design of the Telos equipment allows for correct anatomical positioning and proper equipment alignment to obtain the anatomical demonstration desired. Any muscular compensation is visible on the electronic display and may also be detected by manually examining the muscles for tension.

Before considering taking a stress X-ray, native X-rays are taken in two different planes to rule out a fracture of the bone, if clinically suspected. In such cases, a stress X-ray should not be taken.

The most common ligamental injuries are those of the anterior ankle joint ligaments (fibular side), mostly caused by supination trauma. Injuries of the medial ligaments by pronation trauma occur rather rarely and are mostly accompanied by a fracture of the fibula.

The anterior ankle joint consists of the distal ends of the two bones of the lower leg (tibia and fibula), and one tarsal bone, the talus.

The anterior ankle joint is a hinge articulation, equipped with collateral ligaments. These ligaments are characterized by their fanlike attachments which split up into several parts fixed at different points on the tarsus. Therefore, one ligament is always tense to stabilize the ankle irrespective of the position in which the lower leg and the foot move.

### The telos-Stress-Device allows for separate examination of each ligament

It is recommended to start with the examination of the ligamentum talofibulare anterius, since this ligament is ruptured first with the typical supination trauma, plus the examination is less strenuous for the patient.

The ligamentum talofibulare anterius is examined in a lateral position through a subluxation of the talus into the ventral direction (The heel is fixed, the pressure is applied on the tibia.). Due to the proper positioning of the patient, the foot is flexed in plantar direction (lig. talofibulare anterius is in function), characterized by the origin of the ventral tibial condyle being shifted to the vertex of the trochlea of the talus. Thus the stabilization through the anatomy of the joint is reduced.

While applying the pressure, the foot turns slightly inwards, the tibia outwards (only possible if the knee is flexed at least 30°) around the pivot of the delta ligament suspension.

In order to obtain accurate findings, the X-ray should be taken after one minute in this case, because the talus slowly slides into the ventral direction.

The examination of the ligamentum calcaneofibulare is performed in a.-p.-view by means of the measurement of the opening angle between tibia and talus.

Due to the proper positioning of the patient the foot is in a perpendicular position to the tibia (lig. calcaneofibulare is in function). The flexion of the knee entails a rectangular position of tibia und calcaneus, so that the dorsally tapered talus is firmly fixed in the malleolar furca.

With a simple tilting motion the talus could get jammed in the furca. This problem is solved by means of the construction of the foot holding device. The heel is placed excentrically to the pivot of the footholding device which, besides the tilting motion, performs an additional movement in tensile direction, thus pulling the talus out of the furca beyond the pivot of the ligamentum deltoideum.

Moreover, flexion of the knee prevents a painrelieving hip turning motion of the patient. As to the examination of the medial ligaments of the anterior ankle joint (lig. deltoideum) the biomechanical problems are the same.

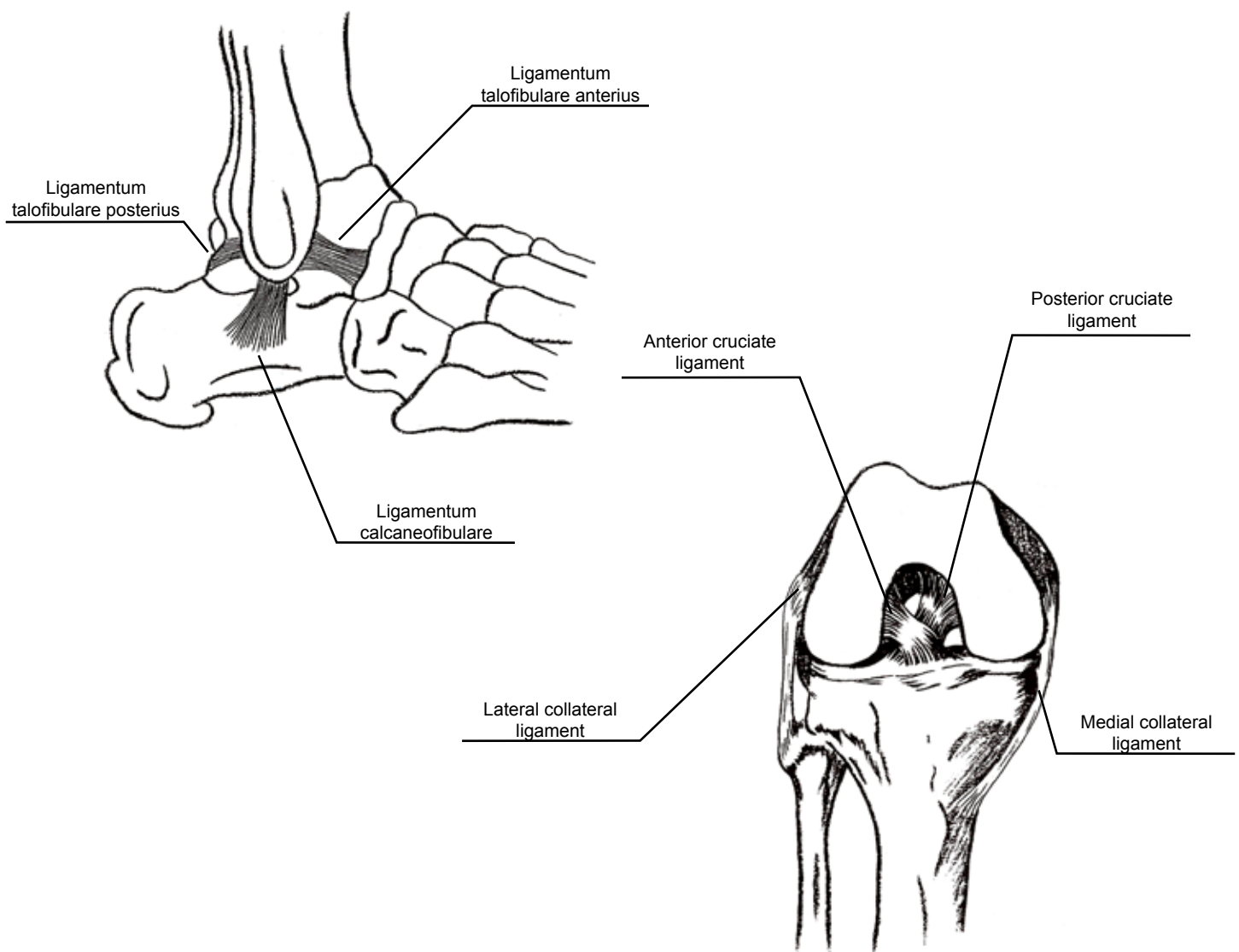
The pressure load applied in all stress examinations should not exceed 15 daN. This empiric value is internationally accepted. Studies performed under fluroscopic control have shown that the joint opens at values between 6 daN and 7 daN, if the ligament to be examined is ruptured. A higher pressure load than 15 daN is not advisable, because the increasing pain-induced muscular reaction force of the patient can hardly be circumvented.

In case an X-ray is not taken with the recommended pressure load, the load actually used should be recorded on the picture to inform the attending physician in order to avoid a false diagnosis. Comparative X-rays of the counterside should always be taken under the same load.

When mounting the equipment, please follow the schematic drawings which show the telos-Stress-Device from a top view. It is important to mount each accessory as depicted.

Examination of the collateral ligaments of the knee in sedentary position results in the desired flexion of 15° to 20°. An enlargement of the flexion up to 30° could be achieved easily. In case the knee shall be examined in extension, supine position of the patient in combination with supporting the heel by a cushion is recommended.

The design of the telos-Stress-Device also allows for examining the cruciate ligaments of the knee while rotating the tibia in- or outwards. Please note, that the attending physician could be exposed to indirect X-ray radiation because he has to maintain the inner or outer rotation of the tibia manually during this examination.





## Instructions for use

The telos-Stress-Device consists of a frame **2**, with movable extension arms **2.2**, which can be adjusted to the length of the leg. The frame has four elastic footings **2.3**, so that the device stands firmly on the X-ray table. The extension arms **2.2** contain four guide bushes **2.1** into which a counter support **4**, the foot holding device **3** and other accessories may be mounted.

The pressure device **1** has an electronic measuring equipment and is used to apply force on the joint. The value of the force is indicated by the digital display **1.3**. The values shown indicate the force applied in dekaNewton (daN) (e. g. read-out 15 = 15 daN  $\approx$  15 kp). The electronic measuring equipment is powered by three commercially available batteries. There is very little power consumption when the device switches off, so the display will work for years.

If alkaline batteries are used, the lifetime will be approximately 150 - 200 hours of use. To avoid damages the batteries should be removed if the device is not in use for a longer period of time. The light intensity of the display is controlled independently from the actual state of charge of the batteries.

If the batteries need to be replaced the display will start to blink and indicates the user to replace the batteries. The display will still show the correct values. If the capacity decreases further the display will show '88' and blink. The danger of false measurements is ruled out in this case.

Although the electronics is quite shock-resistant it is advisable to handle the telos-Stress-Device as careful as any other precision apparatus and should not be sprayed on with solvents.

To apply pressure the grip **1.8** is turned clockwise until the desired readout is reached. The pressure device has a built-in quick adjustment function, which could be operated by pressing the quick-release button **1.5**. This function allows to overcome long distances quickly.



**Do not use the quick adjustment function if there is a pressure readout on the display.**

Please turn the grip counter-clockwise until the display shuts off (= no pressure) and then use the quick adjustment function.

If the spatial proportion is appropriate it is recommended to turn the device 180° and leave the patient in his position when changing the sides to be examined.

### 1. Pressure device

- 1.1 Front cushion
- 1.2 Extension
- 1.3 Display
- 1.4 Display cover
- 1.5 Quick release button
- 1.6 Safety latch
- 1.7 Guiding shaft
- 1.8 Turning grip
- 1.9 Threaded spindle

### 4. Counter support

- 4.1 Rounded cushion
- 4.2 Socket pin

### 2. Frame

- 2.1 Guide bush
- 2.2 Extension arm
- 2.3 Elastic footings
- 2.4 Guide rail

### 5. Extension bar

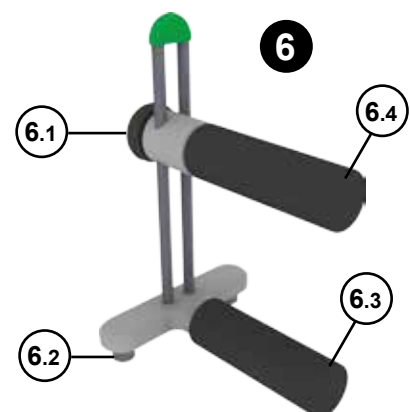
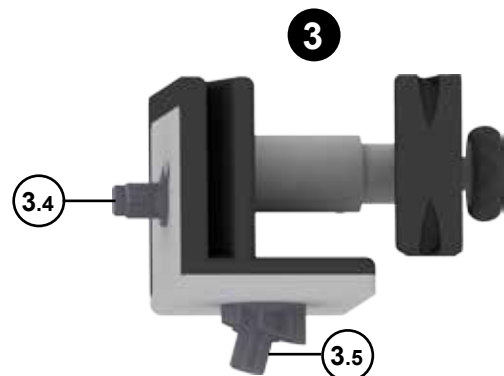
- 5.1 Socket pin
- 5.2 Guide bush

### 3. Foot holding device

- 3.1 Fastening screw
- 3.2 Swivel clamp
- 3.3 Fastening cushion
- 3.4 Socket pin (for lateral X-ray)
- 3.5 Socket pin (for a.-p.-X-ray)
- 3.6 Reducer

### 6. „Back drawer“

- 6.1 Fastening screw
- 6.2 Socket pin
- 6.3 Rounded cushion (fixed)
- 6.4 Rounded cushion (moveable)





The working principle of the telos-Stress-Device is based on a lever action with two fixed points. For examination of the ankle joint the footholding device 3 and one counter support 4 is used.

The use of the reducer 3.6 is recommended for patients with very small feet (e.g. children). The foot holding device 3 has two socket pins 3.4 and 3.5. The axial pin 3.4 is used for taking X-rays in lateral view, the slanted (15°) pin 3.5 is used for taking X-rays in a.-p.-view.

The fixation unit 3.2 is used to secure the heel into the foot holding device during examinations in a.-p.-view only.

Examination of the collateral ligaments and the cruciate ligaments is done with the extension 1.2 and two counter supports 4.

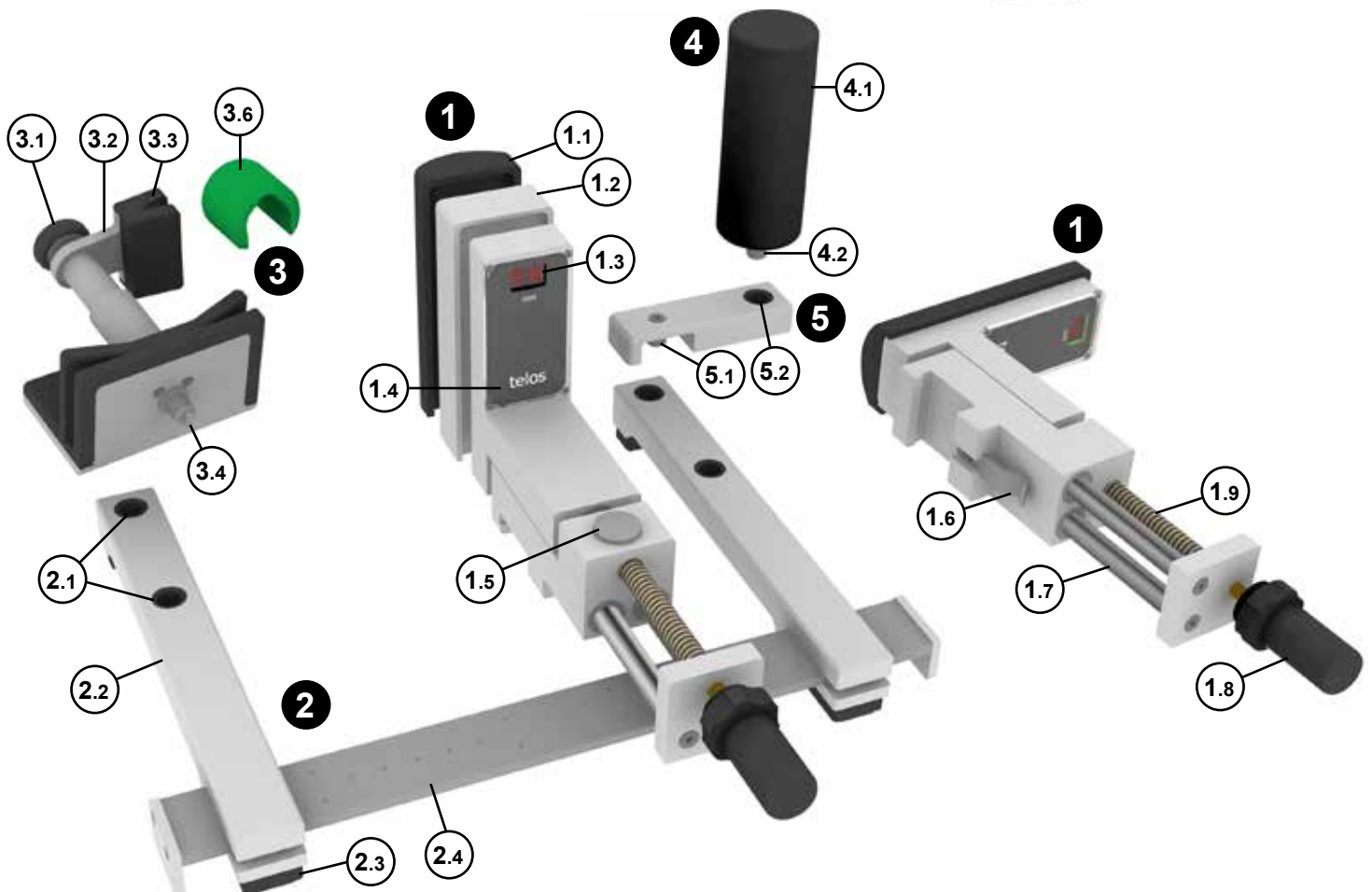
The extension bar 5 holds a counter support 4 and is needed to examine the cruciate ligaments in 10°-20° flexion (Lachman's test) as well as the anterior cruciate ligament in 90°-Position (anterior drawer).

The accessory „Back Drawer“ 6 is used for the examination of the posterior cruciate ligament in a 90°-position only. This clamp serves to fix the thigh distal of the femoral condyles. The antipole is one counter support 4.



**When mounting the pressure device 1 on the guide rail 2.4 of the frame, please secure the pressure device by sliding the safety latch 1.6 located at the bottom forward in order to avoid tilting of the pressure device off the guide rail 2.4.**

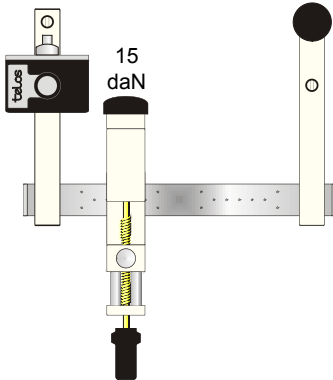
### Transport and storage case



## Examination of the ligamentum talofibulare anterius

### Talocalcaneal joint in lateral view

#### Device setup for the left leg



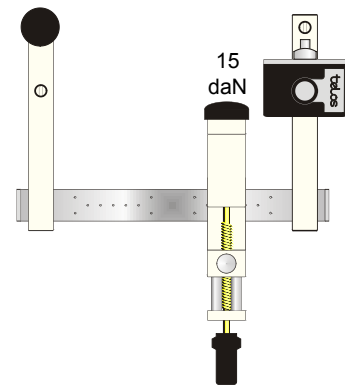
#### Positioning of the patient for the left leg



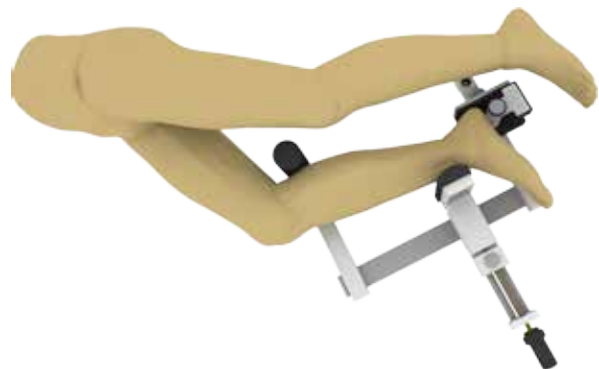
#### Please note

- Mount the footholder to the extension arm by fitting the axial socket pin into the inner guide bush so it cannot turn.
- Mount a counter support in the outer guide bush of the opposite arm.
- Put the patient in a lateral position with the knee flexed in 30° (the leg is seen from medial).
- The heel must be placed firmly against the center bar of the foot holder.
- Place the front cushion of the pressure device approx. 5 cm above the inner maleolus (see X-ray).
- Pressure load for routine examination: 15 daN.
- The X-ray should be taken after 1 minute of pressure application.

#### Device setup for the right leg



#### Positioning of the patient for the right leg



### Information for diagnostics

The subluxation of the talus in ventral direction is measured

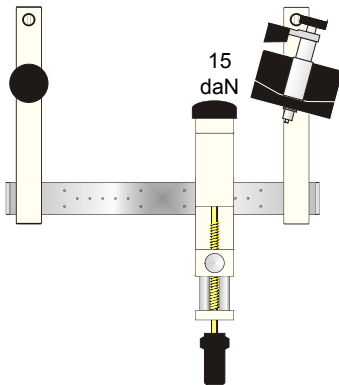
- The distance between the rearmost part of the tibia joint surface to the nearest point of the talus surface is measured.
- More than 10 mm = positive findings according to the actual state of medical scientific knowledge.
- With clinical findings in combination with a measurement of 5 - 10 mm a comparative X-ray is recommended.



## Examination of the ligamentum calcaneofibulare

### Talocalcaneal joint in a.-p.-view

#### Device setup for the left leg



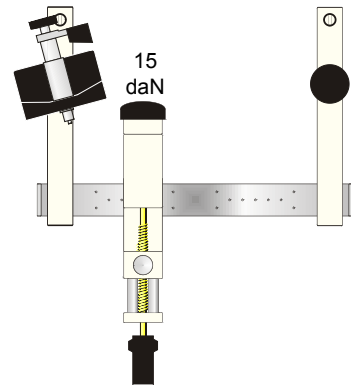
#### Positioning of the patient for the left leg



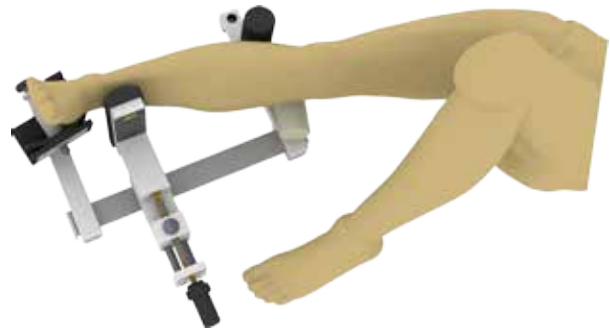
#### Please note

- Mount the 15° slanted pin of the foot holder into the inner guide bush.
- Mount the counter-support into the opposite guide bush.
- Sit the patient with his knee approx. 20° flexed (supported with a cushion under the hollow of the knee).
- The heel should be placed firmly against the center bar of the foot holder.
- Fix the heel by using the swivel clamp and turning the fastening screw clockwise.
- Place the front cushion of the pressure device approx. 5 cm above the inner malleolus (see X-ray).
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



#### Positioning of the patient for the right leg



### Information for diagnostics

The opening angle between tibia and talus is measured

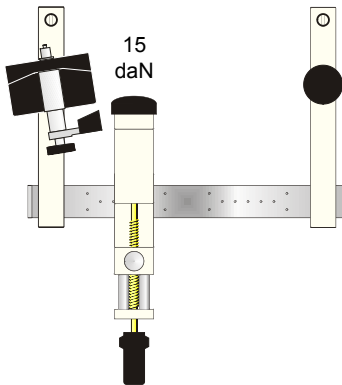
- A value above 10° is pathologic according to the actual state of medical scientific knowledge.
- A value between 5 - 10° makes a comparative X-ray necessary.
- In addition a difference of the distances between the tip of the fibula and talus (comparative X-ray) can be evaluated as another sign for a rupture.



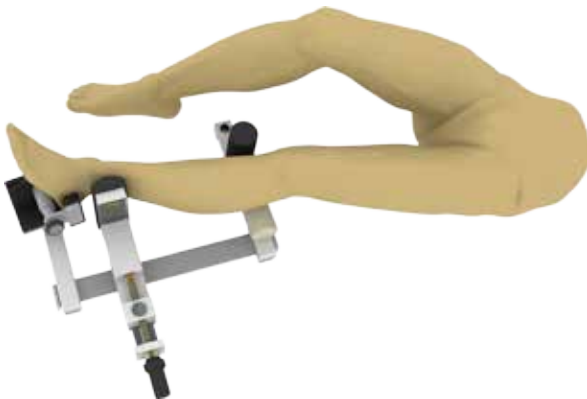
## Examination of the ligamentum deltoideum

### Talocalcaneal joint in a.-p.-view

#### Device setup for the left leg



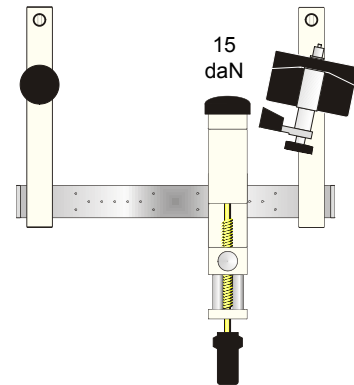
#### Positioning of the patient for the left leg



#### Please note

- Mount the 15° slanted pin of the foot holder into the inner guide bush.
- Mount the counter-support into the opposite guide bush.
- Sit the patient with his knee approx. 20° flexed (supported with a cushion under the hollow of the knee).
- The heel should be placed firmly against the center bar of the foot holder.
- Fix the heel by using the swivel clamp and turning the fastening screw clockwise.
- Place the front cushion of the pressure device approx. 5 cm above the outer maleolus (see X-ray).
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



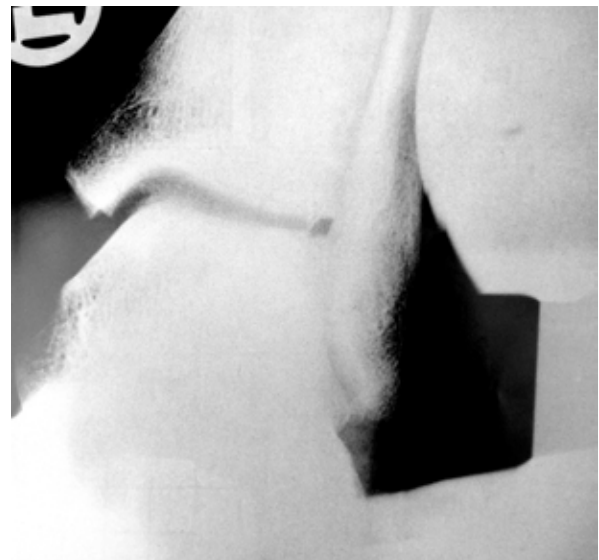
#### Positioning of the patient for the right leg



### Information for diagnostics

#### Comparative X-rays are indispensable

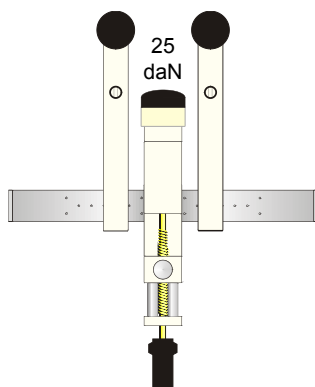
- A value above 10° is pathologic according to the actual state of medical scientific knowledge.
- A value between 5 - 10° makes a comparative X-ray necessary.
- This examination technique is rarely used in the routine diagnostics since the typical eversion trauma is generally accompanied by a fibula fracture.



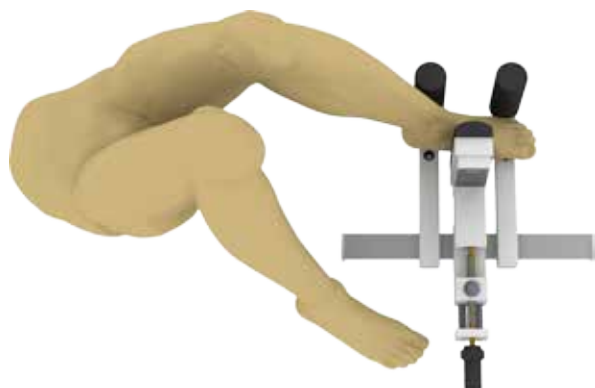
## Examination of the ligamentum calcaneocuboideum dorsale

### Lateral calcaneocuboidal joint in dorsoplantar view

#### Device setup for the left leg



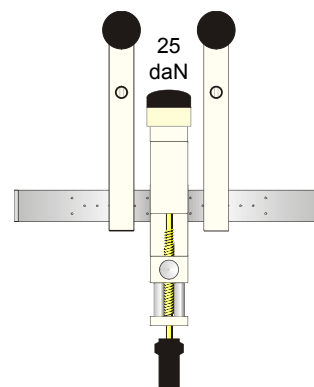
#### Positioning of the patient for the left leg



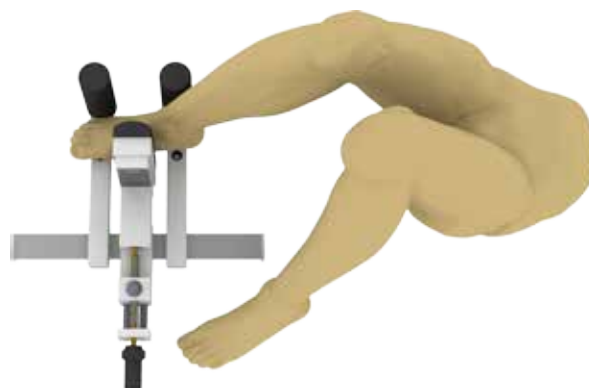
#### Please note

- Insert two counter supports into the outer guide bushes.
- Place the extension arms approx. 2 cm adjacent to the pressure device.
- Mount the extension piece to the pressure device.
- Sit the patient with his knee flexed at 90° and the sole flat (see fig.).
- Place the pressure device a little proximal of the tuberositas ossis navicularis. (The lateral Chopart's joint lies more distal than the medial Chopart's joint).
- Pressure load for routine examination: 25 daN.

#### Device setup for the right leg



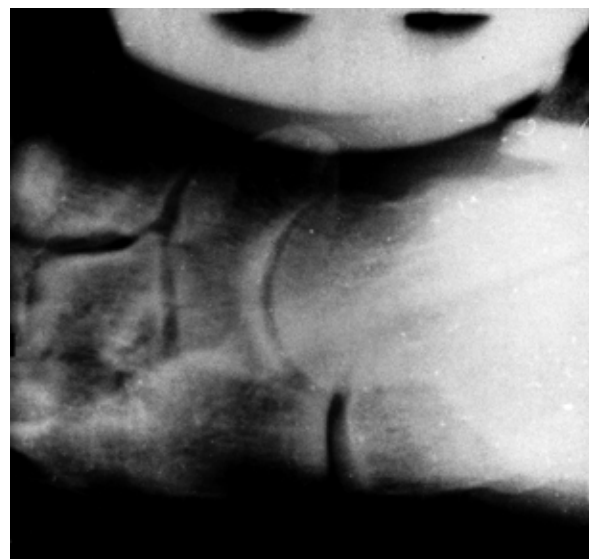
#### Positioning of the patient for the right leg



### Information for diagnostics

#### Comparative X-rays are indispensable

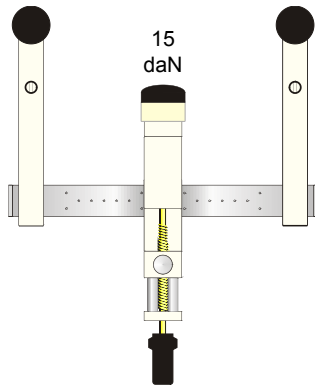
- An opening of more than 5 mm is pathologic according to the actual state of medical scientific knowledge.
- A difference of more than 2 mm between comparative X-rays is pathologic.



## Examination of the ligamentum collaterale tibiale

### Knee in a.-p.-view

#### Device setup for the left leg



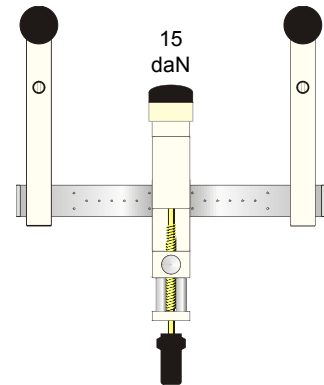
#### Positioning of the patient for the left leg



#### Please note

- Insert two counter supports into the outer guide bushes.
- Mount the extension piece to the pressure device.
- Place the pressure device exactly in the middle between the counter supports.
- Sit the patient with the knee flexed in 15° minimum.
- The flexion of the knee must not exceed 30°.
- The front cushion pad of the pressure device should lie on the lateral articular space.
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



#### Positioning of the patient for the right leg



### Information for diagnostics

The width of the medial articular space is measured

- An opening of more than 15 mm is pathologic according to the actual state of medical scientific knowledge.
- An opening of more than 10 mm: a comparative X-ray is strongly recommended.

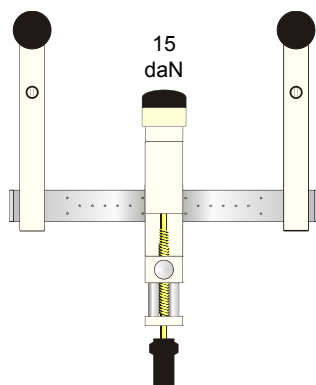




## Examination of the ligamentum collaterale fibulare

### Knee in a.-p.-view

#### Device setup for the left leg



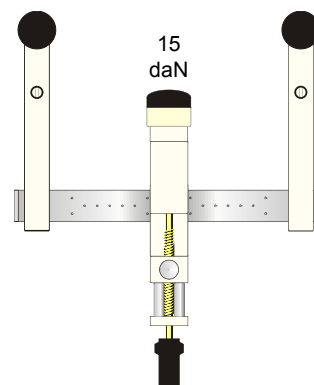
#### Positioning of the patient for the left leg



#### Please note

- Insert two counter supports into the outer guide bushes.
- Mount the extension piece to the pressure device.
- Place the pressure device exactly in the middle between the counter-supports.
- Sit the patient with the knee flexed in 15° minimum.
- The flexion of the knee must not exceed 30°.
- The front cushion pad of the pressure device should lie on the medial articular space.
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



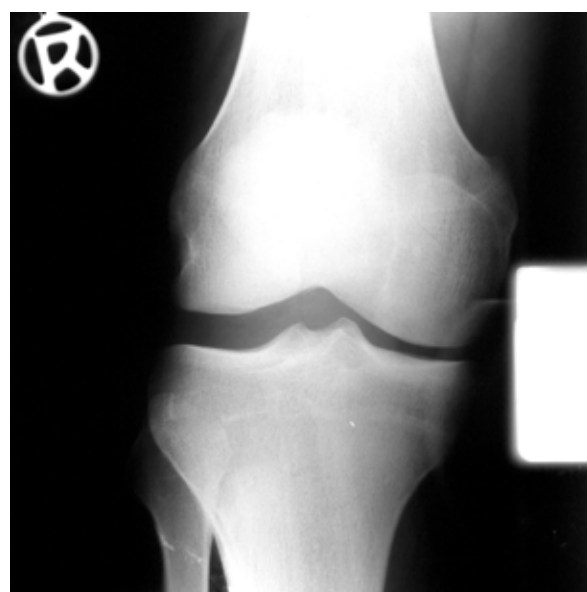
#### Positioning of the patient for the right leg



### Information for diagnostics

The width of the lateral articular space is measured

- An opening of more than 15 mm is pathologic according to the actual state of medical scientific knowledge.
- An opening of more than 10 mm: a comparative X-ray is strongly recommended.

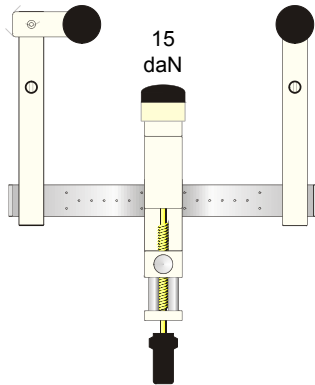




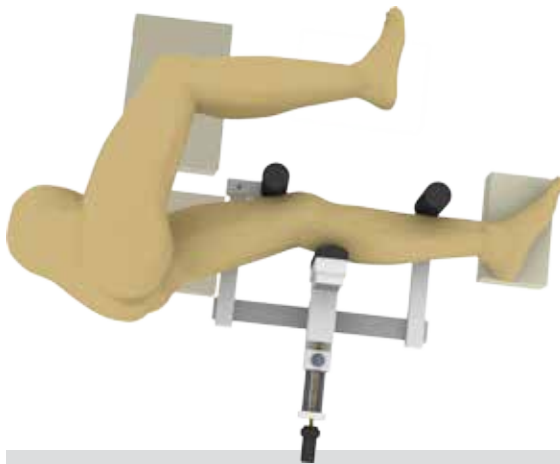
## Examination of the anterior cruciate ligament (Lachman's test)

### Knee in lateral view

#### Device setup for the left leg



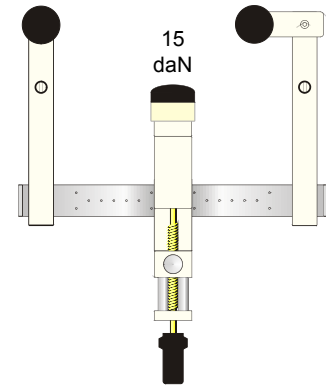
#### Positioning of the patient for the left leg



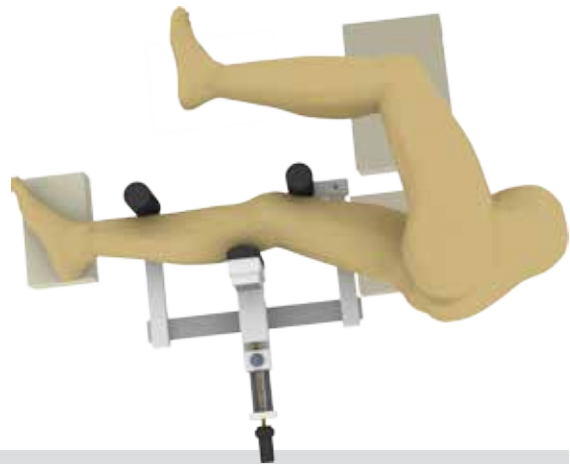
#### Please note

- Mount a counter support in the outer guide bush.
- Mount the extension bar as depicted and insert another counter support in the guide bush of the extension bar.
- Position the patient in a "lateral recumbent position" (see fig.) with the knee flexed 10-20°.
- The tibia should lie parallel to the X-ray table (place a cushion under the heel).
- The front cushion pad of the pressure device should lie approx. 6 cm distal the hollow of the knee.
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



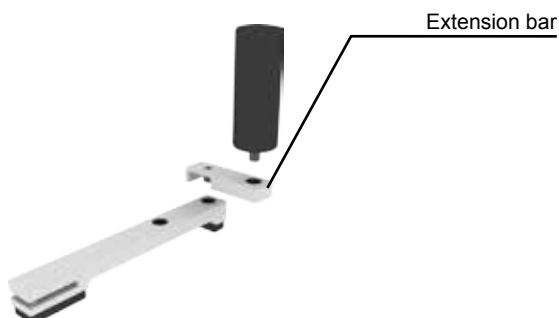
#### Positioning of the patient for the right leg



### Information for diagnostics

#### Comparative X-rays are recommended

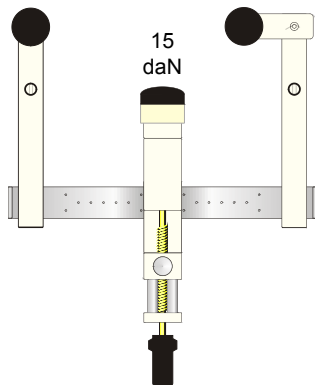
- The contours of the dorsal edge of the medial and lateral tibial plateau should lie as close as possible together, as well as the contours of the dorsal edge of the femoral condyles (= sufficient outer rotation).
- Anterior drawer values from 10 mm on are pathologic for a lesion of the anterior cruciate ligament according to the actual state of medical scientific knowledge.



## Examination of the posterior cruciate ligament (Lachman's test)

### Knee in lateral view

#### Device setup for the left leg



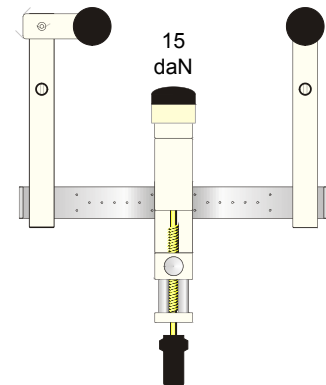
#### Positioning of the patient for the left leg



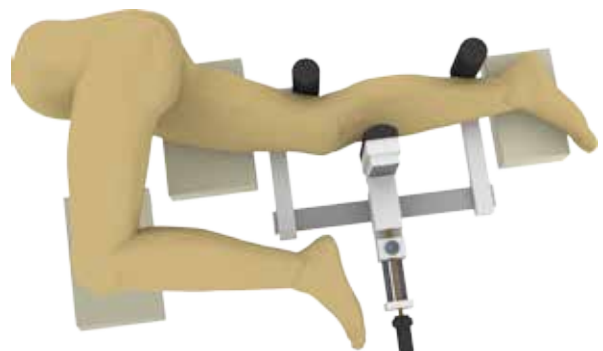
#### Please note

- Mount a counter support in the outer guide bush.
- Mount the extension bar as depicted and insert another counter support in the guide bush of the extension bar.
- Position the patient in a "lateral recumbent position" (see fig.) with the knee flexed 10-20°.
- The tibia should lie parallel to the X-ray table (place a cushion under the heel).
- The front cushion pad of the pressure device should lie on the tuberositas tibiae.
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



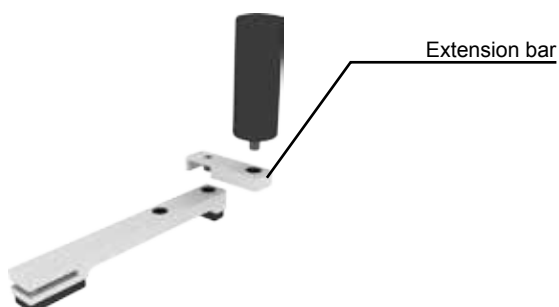
#### Positioning of the patient for the right leg



### Information for diagnostics

#### Comparative X-rays are indispensable

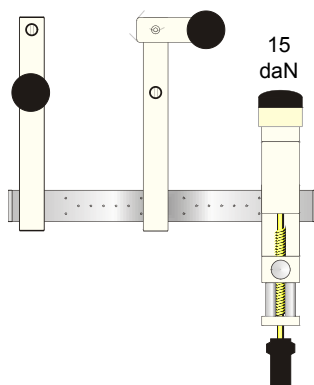
- The contours of the dorsal edge of the medial and lateral tibial plateau should lie as close as possible together, as well as the contours of the dorsal edge of the femoral condyles (= sufficient outer rotation).
- Posterior drawer values from 10 mm on are pathologic for a lesion of the posterior cruciate ligament according to the actual state of medical scientific knowledge.
- If necessary, superimpose the X-rays of both knee joints.



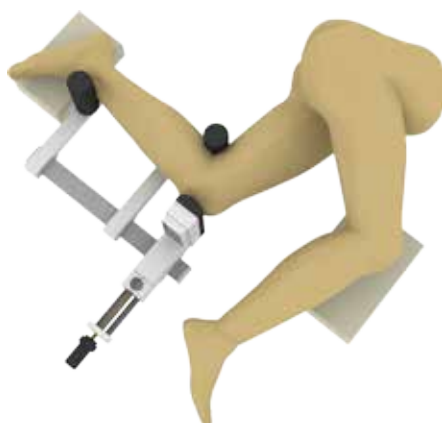
## Examination of the anterior cruciate ligament (90°)

### Knee in lateral view

#### Device setup for the left leg



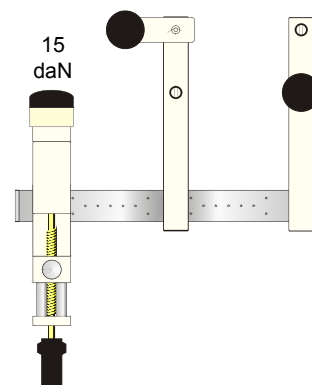
#### Positioning of the patient for the left leg



#### Please note

- Mount a counter support in the inner guide bush.
- Mount the extension bar as depicted and insert another counter support in the guide bush of the extension bar.
- Mount the pressure device outside of the extension arms.
- Position the patient in a "lateral recumbent position" (see fig.) with the knee flexed 90°.
- The tibia should lie parallel to the X-ray table (Support under the ankle).
- The front cushion pad of the pressure device should lie exactly on the patella.
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



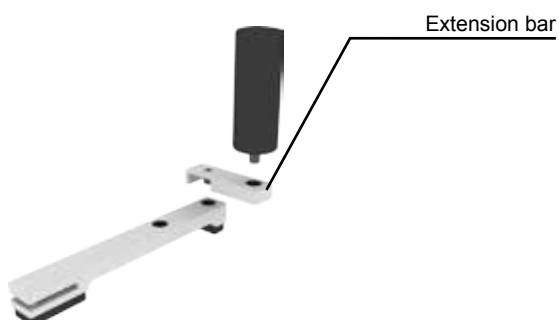
#### Positioning of the patient for the right leg



### Information for diagnostics

#### Comparative X-rays are indispensable

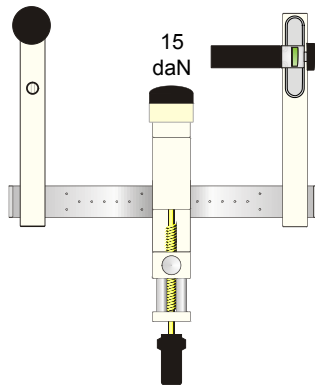
- Check ventral displacement of the tibial head by superimposing the X-rays.
- A difference of 3 mm is pathologic according to the actual state of medical scientific knowledge.
- A drawer of 2 mm could represent a rupture if clinically suspected.



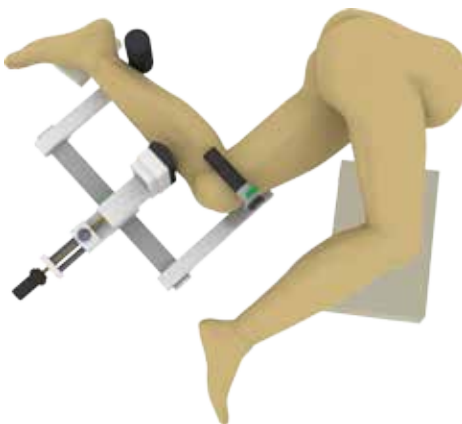
## Examination of the posterior cruciate ligament (90°)

### Knee in lateral view

#### Device setup for the left leg



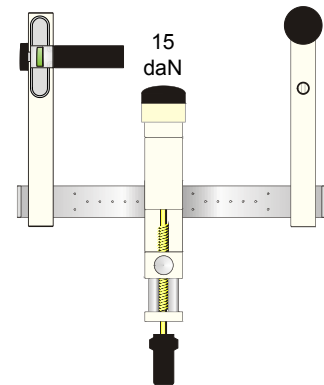
#### Positioning of the patient for the left leg



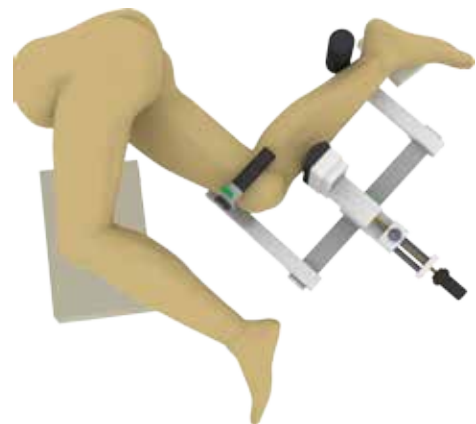
#### Please note

- Mount a counter support in the outer guide bush.
- Mount the accessory „Back Drawer“ as depicted.
- Position the patient in a “lateral recumbent position” (see fig.) with the knee flexed 90°.
- The tibia should lie parallel to the X-ray table (Support under the ankle).
- The accessory “Back Drawer” should fix the thigh closely above the femoral condyles.
- The front cushion pad of the pressure device should lie approx. 2 cm below the tibial head.
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



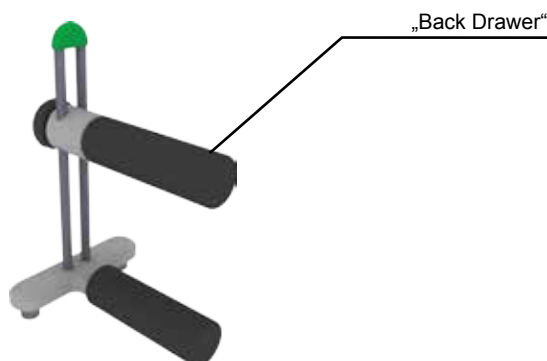
#### Positioning of the patient for the right leg



### Information for diagnostics

#### Comparative X-rays are indispensable

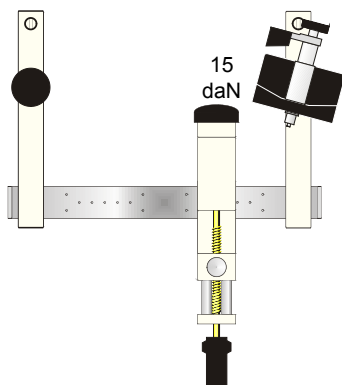
- Check dorsal displacing of the tibial head (drawer phenomenon) by superimposing the X-rays.



## Examination of the ligamentum talocalcaneare interosseum

### Subtalar joint

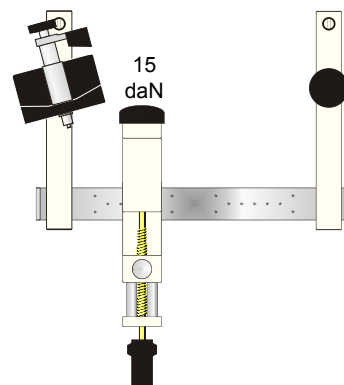
#### Device setup for the left leg



#### Please note

- Mount the 30° - adaptor into the inner guide bush.
- Mount the 15° slanted pin of the foot holder into the adaptor.
- Mount the counter support into the opposite guide bush.
- Sit the patient with his knee approx. 20° flexed.
- The heel should be placed firmly against the center bar of the foot holder.
- Fix the heel with the swivel clamp by turning the fastening screw clockwise.
- Place the front cushion of the pressure device approx. 5 cm above the inner malleolus.
- Pressure load for routine examination: 15 daN.

#### Device setup for the right leg



### IMPORTANT: The tube has to be tilted 30° caudio-cranial!

#### Positioning of the patient for the left leg

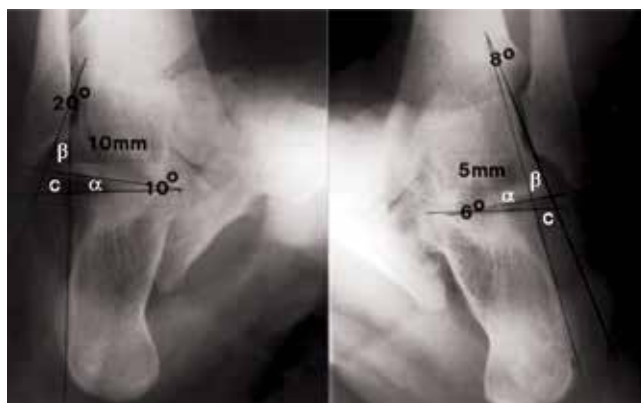


#### Positioning of the patient for the right leg



### Information for diagnostics

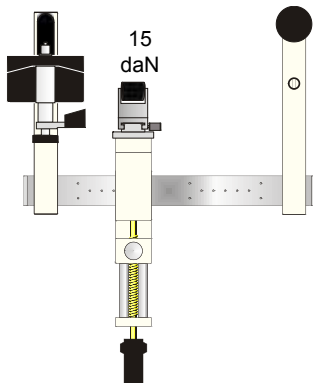
- The horizontal opening between talus und calcaneus is measured ( $\angle \alpha$ ) - more than 5° are pathologic according to the actual state of medical scientific knowledge.
- The translation inwards from the calcaneus towards the talus is measured (c) - more than 5 mm are pathologic according to the actual state of medical scientific knowledge.
- The vertical talo-calcaneare angle, determined by outer tangents at the talus and calcaneus, is measured ( $\angle \beta$ ) - more than 10° are pathologic according to the actual state of medical scientific knowledge.



## Examination of the syndesmosis

### Shank in a.-p.-view

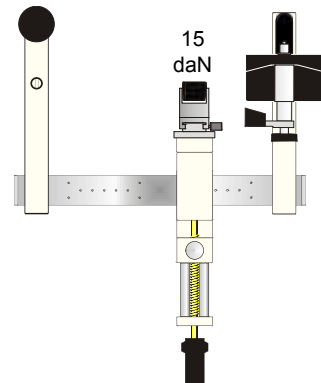
#### Device setup for the left leg



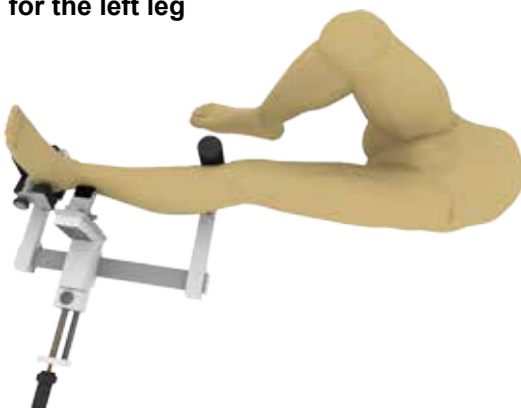
#### Please note

- Mount a counter support into the outer guide bush.
- First mount the anti-rotation lock and then the footholder on the opposite extension arm as depicted (see fig.).
- Instead of the front cushion install the adaptor with the pressure roll on the pressure device.
- The height of the pressure roll can be fixed with the fastening screw.
- Sit the patient with his knee approx. 20° flexed.
- Fix the heel with the swivel clamp by turning the fastening screw clockwise.
- Place the pressure roll approx. 5 cm above the lateral maleolus and anterior of the tibia.
- Pressure load for routine examination: 15 daN.

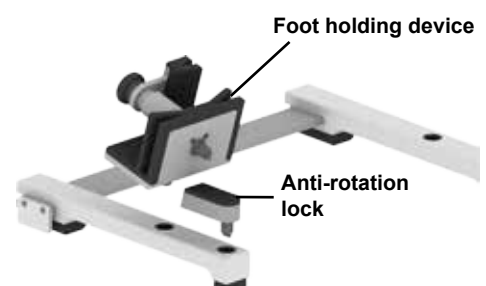
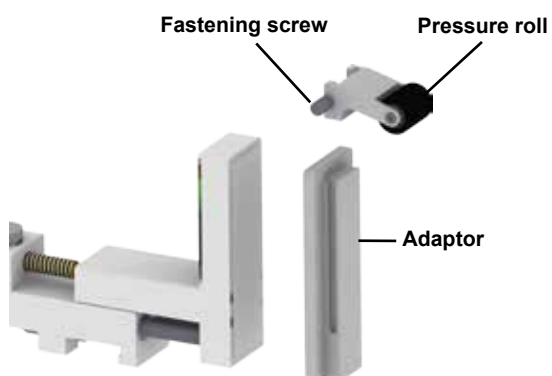
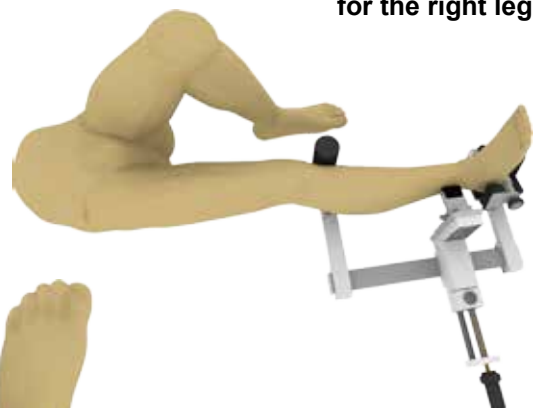
#### Device setup for the right leg



#### Positioning of the patient for the left leg



#### Positioning of the patient for the right leg

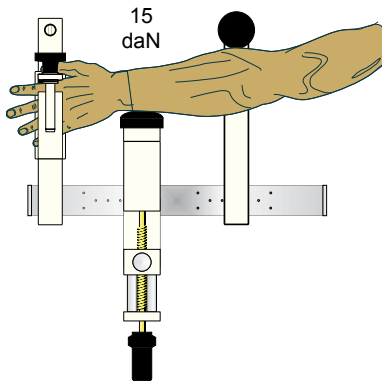




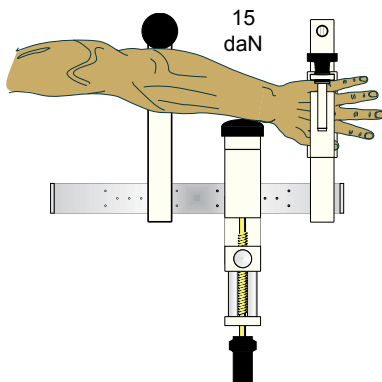
## Examination of the ligamental structure of the proximal row of the wrist bones

### Wrist joint in a.-p.-view

#### Device setup for the left arm - ulnar



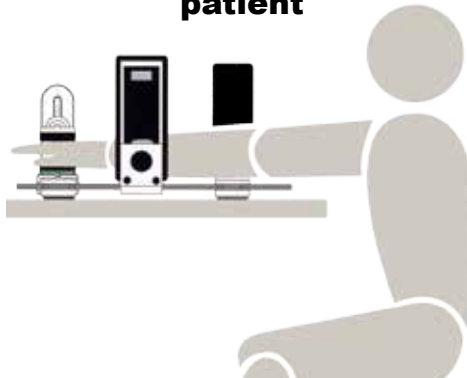
#### Device setup for the left arm - radial



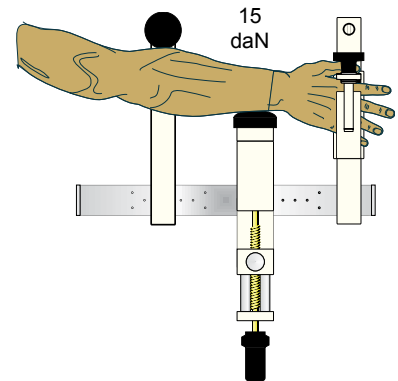
#### Please note

- Position the patient sitting at the X-Ray table with shoulder, elbow and hand forming a horizontally even line (s. fig.).
- The hand and the lower arm should lie flat on the device.
- To prevent rotation, fix the hand with the upper bar against the back of the hand.
- For a radial stress-X-Ray place the pressure device proximal of the proc. styloideus radii.
- For an ulnar stress-X-Ray place the pressure device proximal of the proc. styloideus ulnae.
- Pressure load for routine examination: 15 daN.
- The X-Ray should be taken after 1 minute of pressure application.

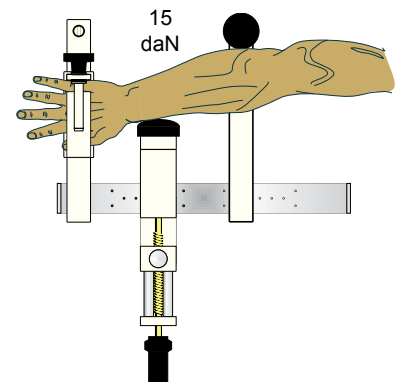
#### Positioning of the patient



#### Device setup for the right arm - ulnar



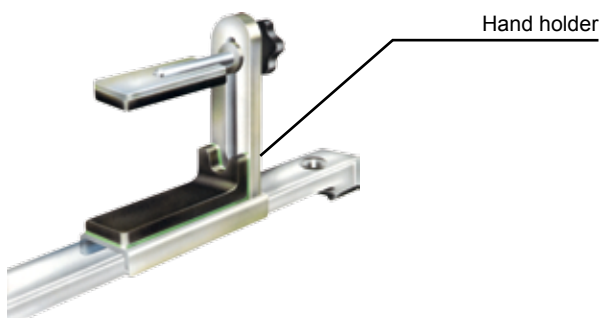
#### Device setup for the right arm - radial



### Information for diagnostics

#### Examination of the ligamental carpal stability

- To prove the scapho-lunal dislocation, an X-Ray with ulnar stress is sufficient.
- A scapho-lunal distance of more than 3 mm is pathologic according to the actual state of medical scientific knowledge.
- The radial stress-X-Ray serves as a proof of the less common dislocation between os lunatum und os triquetrum.





## Accessories for GA-III/E

**30°-adaptor to examine the subtalar joint**



**Accessory to examine the syndesmosis**



**Hand holder to examine the wrist joint**



## Stress examination of other joints

**Shoulder positioning device to examine the glenohumeral joint**



**Thumb holder to examine the thumb basal joint**



**MBA to examine the metatarsalia**



## Other positioning aids

**Universal cassette stand for use in radiology dept.**



**Foot-holding device for performing Defilé X-rays**



**Positioning board for use in radiology dept. and O.R.**



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